

## MISSION OF ARMY ENGINEER PROJECT MANAGEMENT

## CHAPTER 1

### MANAGEMENT THEORY

Management definitions are as varied as the authors who write books about the subject. A good definition states that management is "the process of getting things done through people." Project management may be defined more specifically as "the process of coordinating the skill and labor of personnel using machines and materials to form the materials into a desired structure. "Project construction operations include planning, designing facilities, procuring materials and equipment, and supervising construction. An important Army management principle states that "continual improvement in systems, methods, and use of resources is required for continuous effectiveness in operations." In most large nontactical Army organizations, management engineering staffs help commanders and line operators design new ways to work faster, cheaper, and better.

#### PRINCIPLES DERIVED FROM EXPERIENCE

Management principles have been developed from experience and serve as a basis for managing human and material resources. They do not furnish definite formulas or solutions to all management problems, nor are they infallible laws; they are only guidelines for action. Effective management should encompass--

- Clearly defined policies understood by those who are to carry them out.
- Subdivision of work, systematically planned and programmed.

- Specific assignment of tasks and an assurance that subordinates clearly understand the tasks.
- Adequate allocation of resources.
- Delegation of authority equal to the level of responsibility.
- Clear authority relationships.
- Unity of command and purpose throughout an organization.
- Effective and qualified leadership at each echelon.
- Continuous accountability for use of resources and production results.
- Effective coordination of all individual and group efforts.

#### DIFFERENCES FROM CIVILIAN PRACTICES

In a TO, construction, repair, rehabilitation, and maintenance of facilities differ considerably from civilian practices. Although the engineering principles involved are unchanged, in combat area operations the factors of time, personnel, materials, and enemy action impose a great range of problems. This requires modification of construction methods and concentration of effort. Engineers in a TO nor really do not build permanent facilities.

The variety of construction in the military, often done on an expedited or "crash" basis, creates challenging management problems.

In fact, each project is unique in its location, weather conditions, climate, soil, and possible enemy action. Standard designs are used, but they must be adapted to each particular site. Construction materials are often less uniform than those used in the manufacturing industries. Management under these conditions involves unusual problems.

### THE DECISION-MAKING PROCESS IN PROJECT MANAGEMENT

#### **Make assumptions based on facts.**

Weather predictions are based on past weather data. Policies for observing national holidays are expected to continue. These are basic facts and forecast data that may affect the future.

The effect of climate on construction operations is so great that the evaluation of this item alone can be as important as all other factors combined. If the planner fails to consider weather, more time may be lost because of bad weather than would be needed to finish all the work in favorable weather. The planner must evaluate each type of work to be done in relation to the weather conditions expected during construction. For example, for road and airfield work, it may be better to do all the clearing and stripping before starting subgrade and sub-base operations. This may be done only if it is certain that there will be little or no rain during clearing and stripping, before adequate drainage can be provided. Evaluating weather lets the planner determine how much time to allow for weather delays.

**Find and examine alternative courses of action.** Construction in a TO requires speed, economy, and flexibility.

**Speed.** Speed is fundamental to all activities in a TO and is especially important to the engineer. Recognizing the importance of speed, the Corps of Engineers has developed and adopted certain policies and practices to help expedite project construction.

- **Standardization.** For hospitals, depots, and shelters, standard designs are used in active TOs to save time in design and construction. Standard designs present the simplest method of using standard materials to build acceptable installations. In building, they permit production-line methods in the prefabrication of construction members. They are designed to reduce the variety of materials required, ensure uniformity and standards, simplify procedures, and minimize costs. Standard designs increase the efficiency of working parties that can repeat erection procedures until they become almost mechanical. Standardization of construction is especially important in time of war.
- **Simplicity.** Construction must be simple during war because of personnel, material, and time shortages. The available labor uses the simplest methods and materials to complete installations in the shortest time.
- **Necessities and life expectancy.** Military engineering in the TO is concerned with only the bare necessities and temporary facilities. Adequate provisions are made for safety, but they are not as elaborate as in civilian practice. For example, local green timbers are often used to construct wharves or pile-bent bridges, even though marine borers will rapidly destroy the timbers. By the time that happens, the focus of military effort may have changed. Sanitary facilities may consist of nothing more than pit latrines. Using valuable time for anything more permanent is not justified. In short, quality is sacrificed for speed and economy.

Construction and repairs in a TO contribute to the sustainment and efficiency of field armies. In an active theater, only essential construction work and development of installations and facilities are performed. The quality of construction does not exceed standards established by the theater commander. Modified emergency construction and the use of permanent

materials (tile, stucco, concrete, and steel) are authorized only in the following situations:

- Such work is required by an agreement with the government of the country in which the facilities are to be located. Prior approval of Headquarters, DA is also required.
  - Materials not really used in emergency construction are not available or cannot be made available in time to meet schedules. However, permanent construction materials are available or can be made available in time to meet schedules, at no increase in total cost. When permanent materials are used, the interior and exterior finishes of structures must be in keeping with emergency construction standards. The permanency of any structure should be consistent with military needs at the time.
- Phase construction. Construction in various phases provides for the rapid completion and use of parts of buildings or installations before the entire project is completed. Specialized crews or working parties, such as fabricating, foundation, plumbing, and roofing crews, may be organized. Each crew performs a specific task and moves on to the next site. Large building projects, such as hospitals, depots, and permanent cantonment areas, are suitable for this type of construction.

Another system of phase construction involves the refinement and evolution of an installation. Construction of a depot will serve as an illustration. Initially, storage is provided in structural frame buildings with footings and roof cladding, but without wall cladding. Later, concrete floors and sidings may be provided, and development may progress in phases until the facilities are adequate.

Both systems are used and have the same objective: to have the using serv-

ice occupy the first building while the second building is being constructed. Phase construction is usually less efficient, but this is offset by the maximum use of facilities at the earliest possible time.

Existing facilities. The use of existing facilities contributes greatly to the essential element of speed. The advantages often influence the point of attack in military operations.

*Economy.* Equipment, personnel, and materials must be used effectively and efficiently, since these resources are limited.

*Flexibility.* A military construction program must be flexible. The ever-changing situation in military construction requires that construction in all stages be adaptable to new conditions. To meet this requirement, standard plans are a part of the Army Facilities Components System (AFCS) and are found in the four technical manuals (TM) described on the following page. The AFCS provides logistical and engineering data which is organized, coded, and published to assist in planning and executing TO construction. The system determines personnel and material requirements as well as the cost, weight, and volume of materials needed for construction.

The AFCS provides construction planning data for --

- Contingency, base development, construction, and logistical planners by presenting a flexible planning tool for TO construction and construction support missions.
- Construction units for various utilities, structures, facilities, installations, and construction tasks required by the Army and Air Force in support of military missions in a TO.
- Logistical commands and supply agencies in requisitioning, identifying items, costing, and other related supply functions.

The AFCS consists of a series of four DA TMs. They are—

- *TM 5-301, Army Facilities Components System--Planning.* This manual, which is generally used by military planners, contains installation, facility, and pre-packaged expendable contingency supply (PECS) summaries. The TM 5-301 series is published in four volumes, each addressing a separate climatic zone. The summaries appearing in the four volumes include cost, shipping weight, volume, and man-hours required for construction.
  - TM 5-301-1 (Temperate) covers geographical areas where mean annual temperatures are between +30° and +70° Fahrenheit (F).
  - TM 5-301-2 (Tropical) covers geographical areas where the mean annual temperatures are higher than +70° F.
  - TM 5-301-3 (Frigid) covers geographical areas where the mean annual temperatures are lower than +30° F.
  - TM 5-301-4 (Desert) covers geographical areas which are arid and without vegetation.
- *TM 5-302, Army Facilities Components System: Design.* This five-volume manual contains site and utility plans for the installation, construction drawings, and construction detail drawings for the facilities. New designs are added and obsolete designs are revised as required to meet the construction needs of the Army. Drawings stamped "Under Revision, Do Not Use" should not be used for construction or planning purposes. However, drawings stamped "Under Re-

vision" may be used for planning purposes.

- *TM 5-303, Army Facilities Components System--Logistic Data and Bills of Materials.* This manual is generally used by planners, builders, and suppliers in identifying items contained in the bills of materials.
- *TM 5-304, Army Facilities Components System User Guide.* This manual explains how to use the system.

**Evaluate the alternatives.** Various courses of action are compared in terms of personnel, material, equipment, and time. This is often difficult because the typical planning problem is filled with uncertainties and intangible factors.

**Select the course of action.** Planning is not yet complete just by accomplishing the above steps. Derivative plans must be developed to support the basic plan. This plan should include all aspects of the project involving administration and logistics. These include, but are not limited to, the following:

- Moving onto the jobsite.
- Bringing in supplies and equipment.
- Locating supply, assembly, work, dining, living, and administrative areas.
- Obtaining and using natural resources.
- Performing daily routine chores.
- Providing area security in a tactical environment.
- Planning for inclement weather.
- Providing for adequate construction site drainage.

## MILITARY CONSTRUCTION MANAGEMENT

The functions of the military construction manager are universal, although they may differ in details from one activity to another. These functions should not be confused with operating tasks such as accounting, engineering, or procurement. The managerial functions are *planning, organizing, staffing, directing, and controlling*. Each of these is aimed toward accomplishing the objective of the unit. To implement these functions, the manager must understand the objectives, plans, and policies of superiors.

### THE PLANNING FUNCTION

Planning means laying out something in advance. Planning creates an orderly sequence of events, defines the principles to be followed in carrying them out, and describes the ultimate disposition of the results. It serves the manager by pointing out the things to be done, their sequence, how long each task should take, and who is responsible for what.

**Goal.** The goal of planning is to minimize resource expenses for a given task. Planning aims at producing an even flow of equipment, materials, and labor and ensuring coordinated effort. Effective planning requires continually checking on events so that the manager can make forecasts and revise plans to maintain the proper course toward the objective.

Much of the manager's job will be characterized by his plans. If the plans are detailed and workable, and if the manager has the authority to undertake them and understands what is expected, he will require little of his superior's time.

In military construction, the planning phase should be divided into two stages: *preliminary planning* and *detailed planning*. These are discussed more fully in Chapter 2.

*Preliminary planning* gives the engineer unit commander a quick overview of the assigned

task and the capacity of the constructing unit to accomplish the tasks. It serves as a guide to the detailed planning which follows. preliminary planning includes a preliminary estimate and procurement of critical items.

*Detailed planning* provides a schedule for the entire construction project and develops an accurate estimate of the materials, labor, and equipment to do each of the subtasks or activities. It includes detailed estimating, scheduling, procurement, and construction plant layout, as well as a review of drawings and specifications.

**Steps.** Planning involves selecting objectives, policies, procedures, and programs. The core of the manager's job in planning is making quality decisions based on investigation and analysis rather than on snap judgment.

**Establish the objective.** The objective provides the key for what to do, where to place emphasis, and how to accomplish the objective.

Engineer construction functions in the TO are the design, construction, repair, rehabilitation, and maintenance of structures. These include roads, bridges, inland waterways, ports, industrial facilities, logistic support facilities, storage and maintenance areas, protective emplacements, hospitals, camps, training areas, housing, administrative space, and utilities. Other functions are the design, construction, and rehabilitation of railroads, airfields, and heliports.

**The construction directive.** The management process starts with the receipt of a directive which is an order to construct, rehabilitate, or maintain a facility. The directive should include a description of the project with plans and specifications. Regardless of the form of the directive or the amount of detail, the construction directive (Figure 1-1, page 1-6) should discuss items essential for the success of the project.

HEADQUARTERS  
10th ENGINEER BRIGADE  
FORT LEONARD WOOD, MO 65473

ABCD-EF

1 May 1994

MEMORANDUM FOR Commander, 77th Engineer Battalion, 10th Engineer  
Brigade

SUBJECT: Construction Directive No. FWM 93002C-11

1. Mission: You will install two culverts per attached plans and specifications.
2. Location: Intersection of Range and Lewis Roads, Fort Leonard Wood, Missouri. See site plan.
3. Time: Construction will begin not later than 1 August 1994.
4. Additional personnel and equipment: An additional scoop loader is available upon request.
5. Priority: A
6. Reports: Submit a complete activities list for the project. Progress reports will be submitted in accordance with brigade SOP.
7. Materials: A two-hour notice is required for pick up of culverts.
8. Special Instructions: No changes are authorized except through brigade S3. The contact officer for the using agency will be MAJ Power, who can be contacted at building 247, telephone 8-7654.

FOR THE COMMANDER:

R. U. FORREST  
CPT, EN  
Adjutant

*Figure 1-1. Sample Construction Directive*

These items, along with comments for planning considerations, are as follows:

**Mission.** The mission will state the exact assignment with all necessary details and may include an implied mission.

Typically, combat battalion (heavy) missions include:

- Construction or rehabilitation of lines of communication (LOC), bridges, forward tactical and cargo airfields, and heliports.
- General construction of buildings, structures, and related facilities.
- Limited reconstruction of railroads, railroad bridges, and ports.
- Limited bituminous paving.
- Minor protective construction.

When supported by attachments of specialized personnel and equipment, engineer combat battalion (heavy) missions include:

- Large-scale bituminous and portland cement paving operations.
- Large-scale quarrying and crushing operations.
- Major railroad and railroad bridge reconstruction.
- Major port rehabilitation.
- Major protective construction.
- Pipeline and storage-tank construction.
- Fixed and tactical bridges.

Corps combat engineer battalion missions include:

- Construction, repair, and maintenance of roads, fords, culverts, landing strips, heliports, command posts, supply installations, buildings, structures, and related facilities.
- Preparation and removal of obstacles, to include minefields.
- Construction and placement of deceptive devices and technical assistance in camouflage operations.

- Site preparation for air defense artillery units.
- Construction of defensive installations.
- Engagement in river-crossing operations, to include assault crossing of troops and construction of tactical rafts and bridges.

Each engineer command, brigade, group, and battalion is authorized a staff to assist the commander. The composition of these staffs and the duties of the staff members vary with the type of organization, its mission, and its echelon of command. Generally, engineer staffs at group or higher echelons perform as planners, designers, advisors, supervisors, inspectors, and coordinators. At battalion level, the staff members are operators. Staff members supervise the implementation of the plans of the higher headquarters. For example, upon receipt of a task directive from brigade, the group staff designs the project, plans and assigns the tasks, and directs the battalions (which are the operating units) to perform the tasks.

For additional information on engineer unit capabilities, see TM 5-304.

**Location.** This may be a definite location, or the directive may require the manager to select a site in a general area.

A site investigation should be made of the selected site or general area. The manager uses this information to determine how the environment will affect the project. A site investigation should provide answers to the following questions:

- What are the *terrain* features of the proposed site? Is it hilly, flat, wooded, swampy, or desert? How will the terrain features affect the project?
- What are the existing *drainage* characteristics? Is the site well drained? What effort will be needed to keep it drained before, during, and after construction?
- What problems will be involved in *accessibility*? What effort will be required to

permit travel to, from, and within the site?

- What is the type of *soil*? What will the unit need to do to prepare for vehicle traffic and construction? How much additional work will the unit have to do to complete the project?
- What are the *existing facilities* (buildings, roads, or utilities) that the unit could use?
- What are the *natural resources* located near the job site, such as timber, water, aggregate, or borrow materials? How far away are they? How many are there?
- What *weather* conditions are expected for the project's duration?
- What is the *enemy* situation? What are the good and bad points of defending the site? What improvements must be made?

**Time.** Time determines the start and finish of the project. If the manager is responsible for planning and estimating, he should be the one to estimate project duration.

Extreme accuracy is not required, as precise calculations are delayed until the detailed planning stage. Approximate rates of production, based on the unit's experience, are usually accurate enough. Where this information is unavailable, published rates in civilian or military texts, tempered by the planner's knowledge of existing conditions, are good substitutes.

The quantity takeoff uses available equipment and personnel to calculate the time required for each item. This time will be increased if the soldiers are inexperienced and require on-site training. The total time for the project is the sum of the times of the subtasks less the time when two or more work items will be done concurrently. See Chapter 2 for detailed planning procedures to more accurately predict the overall project time.

**Personnel.** The manager should already know what personnel are available. This

item of the construction directive tells what additional personnel are available, if needed.

Despite the mechanization of modern warfare, battles are still won and territory is still occupied by soldiers. For this reason, highest priorities on personnel go to units in contact with the enemy. In a combat support role, the engineers have the problem of accomplishing construction quickly with limited personnel. Labor conservation is important. Every engineer must function at peak efficiency for long hours. Assignments must be carefully planned and coordinated. Projects must be well organized and supervised. Personnel must be well cared for and carefully allocated.

A unit's personnel must be considered only in terms of "construction strength." The project manager must use the number of soldiers actually available to work on the job for his calculations. In the current combat heavy battalion table of organization and equipment (TOE 5-115H), only about 50 percent of a full-strength unit is productive in the construction effort. This figure should be used for planning purposes only when more exact data are not available. The project manager must also consider if the project requires large numbers of personnel with particular skills (for example, plumbers or electricians).

The manager should consider the training of the personnel available for the construction effort. A full-strength battalion with many inadequately trained personnel will result in low construction output. The ability and number of supervisors (not included as productive personnel) affects the construction capability of a unit as well. A shortage of competent supervisory personnel will reduce the construction effectiveness of a unit, even though the productive personnel are adequate in number and ability. The project manager may also want to consider contract construction as an option (See Figure 1-2 for issues concerning contract construction.)

**Equipment.** The manager needs to know what equipment is on hand and what



The primary alternative to troop construction is the use of contractors or host-nation support personnel. While nonmilitary construction is often justified, there are definite advantages to using troop construction.

**Advantages of Troop Construction.** First, troop construction is economical, since it eliminates the cost of labor and the contractor's profit. Second, tactical considerations frequently create a situation where contractors or host-nation support personnel are unwilling or unable to undertake a project. Third, troop construction is more flexible since there are no contracts to renegotiate for changes in plans, specifications, or required availability date. Finally, peacetime projects serve as excellent training for soldiers.

**Advantages of Contract Construction.** A contractor may vary the number and skill level of laborers and the amount and type of equipment as a project progresses. Such flexibility is limited when using troop resources. On the basis of unit integrity, the optimum unit and the optimum amount of construction equipment for the project are selected. This method is more desirable than the task-force organization (where labor and equipment are selected to fit the job) because it supports the principles of management. In addition, troop construction equipment is not as specialized as commercial equipment because it must be rugged and flexible enough to meet a variety of combat construction tasks.

**Coordination of Contract Construction.** When a particular TO requires extensive construction, it may demand the controlled and coordinated use of contractors, as well as the military engineer elements of the Army, Navy, Marine Corps, and Air Force. In some cases, another US military service may control the project being built by contract construction or even by the Army.

The manager must be aware that there are limitations on the use of military labor for peacetime projects. Regulations specify severe penalties for violations of these limitations. Therefore, it is the manager's responsibility to question a construction directive if it appears to violate any of the following limitations:

- **Purpose.** Use of military personnel for the maintenance, repair, alteration, and new construction of real property is limited to projects that will attain and maintain technical unit proficiency or to projects restricted by security.
- **Policy.** DA policy prohibits the use of soldiers in competition with civilian labor when it can be avoided. Unless otherwise permitted, lack of funds is not a valid basis for using military personnel on a project.
- **Costs.** Military labor costs are not included when determining the level to which a project must be submitted for approval. However, travel and per diem for troop labor, plus costs of maintenance and operation of government-owned equipment, will be included. The cost of unfunded military labor and equipment depreciation must be compiled and recorded as part of the total project cost.
- **Additions.** No new work can be performed in a new facility within one year of its completion unless approved by DA. An example would be adding partitions in an orderly room.

**Figure 1-2. Choice of troop or contract construction**

additional equipment is available, if needed, to accomplish the mission. He also must determine if the available resources will allow the constructing unit to do the job.

Due to the destructiveness of opposing forces, normal peacetime construction equipment cannot handle the requirements of wartime operations, regardless of the location. The economical use of equipment resources is essential.

The status of a unit's construction equipment, particularly heavy equipment, is an important factor in determining the ability to do a job. The planner must consider the average deadline rates for items of equipment and then judge whether the rates will be maintained, improved, or worsened during a particular job.

**Critical Equipment.** Depending on the type of job, certain items of equipment will be critical because they will govern the overall progress. For example, earth-moving equipment is critical for road and airfield work. Woodworking sets are essential for wood frame structures.

**Distribution.** The planner should tentatively assign the critical equipment to the various construction operations. Assignment will depend on the amount of equipment on hand, deadline rates, and quantity and type of work to be done. For example, in assigning dozers and scrapers to cut and fill operations, the quantities of earthwork and the haul distances will determine how many of the available dozers will be assigned to the scrapers and how many will be used for dozing.

**Priority.** This gives a single priority for the entire project or separate priorities for different stages of a project.

Prioritizing helps to determine how much engineer effort will be devoted to a single task. While detailed priority systems are normally the concern of lower-echelon commands, all levels of command, beginning with the theater commander, will frequently

issue directives to serve as guidelines. Priority ratings are usually listed for items as first, second, third, fourth, and so on. If a priority rating contains several items that might be worked on concurrently, these items are numbered consecutively to show their relative standing. For example, a theater Army commander might list the following priorities:

- First priority: Initial beach landing and docking facilities
- Second priority: Hospital facilities
- Third priority: Wharves and docks

**NOTE:** Details, such as which of the hospital facilities shall be constructed first, are left to the discretion of the local commanders. This conforms to the principle of decentralization, which permits maximum operational freedom to subordinates. The dispersion of forces in a TO requires that engineer authority be decentralized. The engineer in charge of operations at a particular locality must have authority equal to his responsibilities.

**Reports.** Required reports (for control purposes) should be listed and included in the unit standing operating procedure (SOP).

**NOTE:** For more information on reporting, see the CONTROLLING FUNCTION section described later in this chapter.

**Materials.** The construction directive is the authority for requisitioning materials. This item addresses the lead time necessary for procurement, location, and delivery.

During the preliminary planning stage, the planner should keep notes on items that may be critical to the job. These critical items may be readily identified when using the network analysis system (see Chapter 2). Critical items may be materials, equipment, or soldiers with particular skills. Their availability may be important because they are needed immediately for the job, because they are not available locally, or

because a long-lead item for procurement may be required. The manager should study the entire job and the notes and then identify such critical items. The manager can then take action to ensure that the items will be on hand when required.

If necessary, the responsible leadership must organize an overseas wartime construction program to execute the required work in the time allotted and with a minimum of shipped-in tonnage. Local resources must be used, but these are often limited. Engineer battalions normally have no authority for direct, local procurement, so senior engineer headquarters or other military or government organizations must provide materials. This imposes upon the Army the problems of coordination, purchase, and delivery. These materials are normally procured in the United States and may require long-lead times.

*Special Instructions.* This item gives any additional information concerning the project, including instructions for coordinating with the using agency.

### THE ORGANIZING FUNCTION

The organizing function determines the activities required to complete the project, counts and groups these activities, assigns the groups, and delegates authority to complete them. Sometimes all this is called *organization structure*. The organization structure is a tool for accomplishing the project's objectives. It establishes authority relationships and provides for structural coordination. Therefore, organizing is the establishment of the structural relationships by which an enterprise is bound together and the framework in which individual efforts are coordinated.

The power of decision granted to or assumed by the supervisor or manager is authority. When the number of people involved in a project exceeds the span that one person can control, the manager must delegate authority. The delegation of authority is key to effective organization.

An officer making decisions also assumes responsibility and must answer for the results of his decisions. Wherever authority is created, responsibility is created. Although authority may be delegated and divided, responsibility cannot be delegated or divided. No responsible officer can afford to delegate authority without designing a system of control to safeguard the responsibilities.

A manager may delegate the authority to accomplish a service, and a subordinate in turn may delegate a portion of the authority received, but these superiors do not delegate any of their responsibility. No supervisor loses responsibility by assigning a task to another person.

### THE STAFFING FUNCTION

Staffing is finding the right person for the job. Although the modern armed forces place much emphasis on the effective use of mechanized equipment, the military effort depends on the training, assigning, and supervising of people who use this equipment. Often the engineers have construction problems due to limited trained personnel. Solutions to these problems require planning and coordination of personnel assignments.

### THE DIRECTING FUNCTION

The management function of directing involves guiding and supervising subordinates to improve work methods. Open LOC in organizations are maintained in vertical and horizontal directions. While assignments of tasks make organization possible, directing adds a personal relationship. Directing embraces the practical problems in getting personnel to work as a team to accomplish the unit objective. Basically, it concerns managing human behavior and taking action that will improve performance.

The commander must have a thorough knowledge of the organization's structure, the interrelation of activities and personnel, and the capabilities of the unit. In addition, the military manager must be able to lead the organization to accomplish its mission.

The manager can create the best conditions for superior effort by making certain subordinates understand the unit mission and their particular roles in it. People who "know the reason why" are better motivated. A good leader makes it a point to explain to the troops the reasons for undertaking a particular mission.

The terms *manager* and *leader* are not synonymous. The manager coordinates activity by executing managerial functions and accomplishes missions through people. (See Figure 1-3.)

### THE CONTROLLING FUNCTION

Control is a continuing process of adjusting the operation to the situation in order to accomplish the desired objective. The manager must measure and correct activities in order to compel events to conform to plans. For effective control, the manager must be in constant touch with the operations to be sure they are proceeding on course and on schedule. Most of the construction control

problem involves processing large volumes of technical information.

The manager must be sure that the plans are clear, complete, and integrated. Then the necessary authority must be given to the person responsible for a task.

Because of the many changes and situations that may arise on different projects, a control system must be broad enough to cope with all possibilities. Regardless of the circumstances, control depends upon the communication of information, both for gathering data and for implementing the desired corrective action. To provide effective control, communication of information must be--

- Timely. In order to be meaningful, the manager must receive and distribute the information used for controlling in a timely manner. Information should be "forward looking." Focus attention on actions that will cause activities to occur as scheduled, instead of adjusting for events in the past.

Leadership is not management. Management is a bottom line focus: How can I best accomplish certain things? Leadership deals with the top line: What are the things I want to accomplish? In the words of both Peter Drucker and Warren Bennis, "Management is doing things right; leadership is doing the right things." Management is efficiency in climbing the ladder of success; leadership determines whether the ladder is leaning against the right wall.

You can quickly grasp the important difference between the two if you envision a group of producers cutting their way through the jungle with machetes. They're the producers, the problem solvers. They're cutting through the undergrowth, clearing it out.

The managers are behind them, sharpening their machetes, writing policy and procedure manuals, holding muscle development programs, bringing in improved technologies and setting up working schedules and compensation programs for machete wielders.

The leader is the one who climbs the tallest tree, surveys the entire situation, and yells, "Wrong jungle!" But how do the busy, efficient producers and managers often respond? "Shut up! We're making progress."

Efficient management without effective leadership is, as one individual has phrased it, "like straightening deck chairs on the Titanic." No management success can compensate for failure in leadership.

*Excerpts taken from The 7 Habits of Highly Effective People by Stephen R. Covey, copyright 1989 Simon & Schuster, used with permission of Covey Leadership Center, 1-800-331-7716.*

**Figure 1-3. Leadership versus management**

- **Accurate.** Pinpoint and then truthfully report the information necessary for control.
- **Valid.** Information is valid when its content represents a situation as it actually exists. Present this information in appropriate and useful units of measure.
- **Routed properly.** Make information used in controlling directly available to the person who can take or recommend

corrective action, by virtue of both authority to do so and technical knowledge of the project.

- **Economical.** Collect only the information required for effective control, thus minimizing the personnel, time, and money needed to perform the control function.

The controlling function as part of the entire project management process is shown in Figure 1-4.

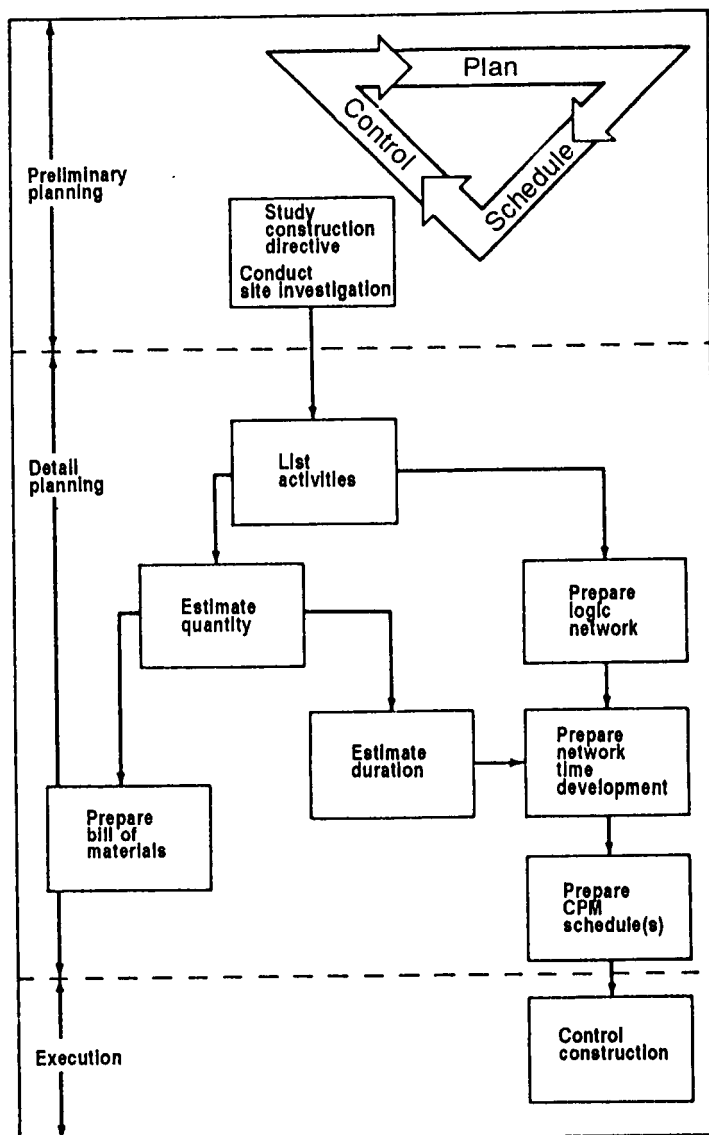


Figure 1-4. Steps of the management process

## EXECUTION

The execution phase begins with the actual start of construction, although some procurement actions may already have taken place. To ensure compliance with the schedule and with the project plans and specifications, the engineer unit commander

uses supervision, inspections, and progress reports. Any changes in project plans and specifications made after construction has begun involve replanning and rescheduling.